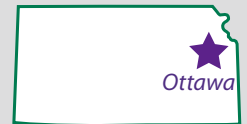


**Intern:** Ana Guanes  
**Major:** Industrial and Manufacturing  
Systems Engineering  
**School:** Kansas State University



## Company background

Kalmar Solutions LLC, a terminal tractor manufacturing company based in the USA, initiated a zero-waste-to-landfill program in 2018 to minimize pollution. Additionally, as a subsidiary of Cargotec, Kalmar aligns with Cargotec's environmental goals of reducing greenhouse gas emissions. Cargotec aims to achieve a 50% reduction in direct emissions controlled by the company and indirect emissions by 2030 and a 25% reduction by 2025.



## Project background

To support Kalmar Solutions in reaching these objectives, five projects have been proposed. These projects include the reduction of energy used for lighting, water consumption, a compressed air leak audit, TV energy reduction and reduction of material waste in receiving. By implementing these projects, Kalmar Solutions will effectively reduce its greenhouse gas emissions and move closer to becoming a zero-waste landfill company.

## Incentives to change

Kalmar Solutions has set a goal to become a zero-waste manufacturing plant and reduce its greenhouse gas emissions by 50% by 2030. This commitment reflects the company's environmental responsibility and its dedication to minimizing pollution. In partnership with Cargotec, Kalmar Solutions aims to reduce greenhouse gas emissions in scope one and two (carbon footprint coming from its own operations), and scope three (carbon footprint from the purchased goods and their use) by 50% by the year 2030.

## PROJECTS REVIEWED FOR P2 POTENTIAL

### Light energy consumption reduction

The current project aims to address the issue of outdated and energy-inefficient lighting at Kalmar Solutions by replacing all fluorescent lights with LED lights and installing and repairing occupancy light sensors and timer sensors. The installation of LED lights is a project that has taken place over the past two years by the maintenance and EHS department. The replacement process has been carried out gradually as lights stop functioning. While significant progress has been made in transitioning to LED lighting, there are still sections within the facility where fluorescent lights remain, posing challenges in terms of energy consumption, environmental impact and operational efficiency. The P2 intern helped Kalmar to locate all the places where the lights fixtures still needed to be switched to LED. Furthermore, the intern provided Kalmar with recommended fixtures for replacement and locations where light sensors should be installed or repaired. The total annual savings for this project is 21,325 kWh or \$2,640 and a three-year payback period.

### Water consumption reduction

The intern saw three opportunities to reduce water usage across Kalmar facilities: sinks, toilets and a fire pump leakage. The intern recommended different installations of fixtures and opportunities for Kalmar to reduce the water usage in these three areas. The intern recommended the installation of water-saving faucets for the sinks and more efficient regulators for the toilets. The intern noticed leaks across toilets and outside the facilities that needed to be repaired as well. The total savings for this project is 510,525 gallons of water per year and \$9,016 annual savings on water bills.

### Compressed air leakage

The objective of this project is to reduce energy consumption by repairing air leaks from the air compressor across Kalmar's facility. The intern completed the compressed air leak audit for Kalmar and a total of 50 air leaks were identified between the main assembly and upfit buildings. By fixing the leaks, Kalmar could save approximately \$12,773.81 per year and reduce energy usage by 106,448 kWh per year, resulting in a reduction of greenhouse gas emissions by 103.175 metric tons of CO<sub>2</sub> equivalent (MTCO<sub>2</sub>e).

## PROJECTS REVIEWED FOR P2 POTENTIAL, CONTINUED

### TV energy usage reduction

Currently at the main assembly area at Kalmar, all the TVs are kept on every day. The intern researched devices to turn them on and off on a schedule and recommended installing Chromecast devices on all the TVs and programming them on a schedule to be turned on and off. This will allow Kalmar to reduce their energy usage per year by 12,480 kWh per year with a cost saving of \$2,020.42.

### Containerization waste reduction

As part of its zero-waste-to-landfill initiative started in 2018, Kalmar started looking for ways to reduce the amount of trash sent for incineration. The industrial engineering group has worked with a third-party packaging company to create returnable racking for many of the parts that Kalmar purchases. As a result of this initiative, many of the parts that are ordered have started to come in on returnable racking, eliminating thousands of pounds of waste every month from wood pallets/plywood, cardboard, plastic banding and plastic wrap. The intern helped Kalmar to analyze the data and find the savings costs and greenhouse gas emissions reduction. The yearly savings that Kalmar had for this project is \$174,303.

## SUMMARY OF 2023 P2 INTERN RECOMMENDATIONS

Project	Annual estimated environmental impact	Estimated cost savings (\$/year)	Status
Light energy consumption reduction	21,325 kWh 20.6 MTCO <sub>2</sub> e	\$2,640	In progress
Water consumption reduction	510,525 Gallons 3 MTCO <sub>2</sub> e	\$9,016	Recommended
Compressed air leakage	103,181 kWh 100 MTCO <sub>2</sub> e	\$12,774	Recommended
TV usage reduction	16,320 kWh 15.8 MTCO <sub>2</sub> e	\$2,020	Recommended
Waste reduction returnable racks	3,252 MTCO <sub>2</sub> e	\$174,303	Implemented
<b>Total<sup>1</sup></b>		<b>\$200,753</b>	
<b>GHG reductions<sup>1,2</sup></b>	<b>3,391 MTCO<sub>2</sub>e</b>		

<sup>1</sup>Does not include projects “not recommended” or where “more research needed.”

<sup>2</sup>EPA P2 GHG Calculator with Cost, 19 November 2022 & EPA WARM Tool- Version 15, September, 2022